WARNING

Because of possible shock or fire hazards, connection of this instrument should be performed in compliance with the National Electric Code (ANSI C1) or any other requirements, or both, which may be applicable to the user.

Installation, operation, and maintenance should only be performed by qualified personnel.

TM-111916-1

VOLUME 1 -- OPERATOR'S MANUAL

626-PA-6013

MASS STORAGE MODULE

1 August 1985

(Rev. 4/1/86)
(Rev. 11/1/87)
(Rev. 9/1/89)
(Rev. B)

See opposite side relative to proprietary rights

Note: Refer to Volume 2 (Service Manual) TM-111916 for maintenance information.

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DRANETZ TECHNOLOGIES, INC.
1000 New Durham Rd.
Edison, New Jersey

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IMPORTANT! CALIBRATION INTERVAL

The recommended calibration interval for this unit is once every 12 MONTHS.

We recommend that you return the unit to the factory for calibration. If you decide to do so, first contact the Dranetz Customer Service Department to obtain an authorization number.

Telephone Number:	(201) 287-3680
Telex Number:	499-7808
TWX Number:	(710) 997-9553
FAX Number:	(201) 248-9240
Cable:	DRANETZ

Then fill out the Repair/Service Order form enclosed in this manual and ship it along with the unit to the Dranetz Customer Service Department. (If this form is missing, ask the Dranetz Customer Service Department for a replacement.)

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VOLUME 1
OPERATOR'S MANUAL

626-PA-6013 MASS STORAGE MODULE

SECTION I
GENERAL INFORMATION

1.1 SCOPE

This manual consists of two volumes. Volume 1, the Operator's manual, is divided into three sections: I) GENERAL INFORMATION, II) INSTALLATION AND OPERATION, and III) OPERATIONAL TEST. Volume 2, the Service manual, contains the maintenance instructions and consists of four sections, IV through VII. (See Volume 2 for a description of these sections.)

1.2 INTRODUCTION

This manual provides the installation and operating instructions for the 626-PA-6013 Mass Storage Plug-In Module, referred to as the 6013 plug-in. The 6013 plug-in is designed for installation into the Series 626 Universal Disturbance Analyzer Mainframe, referred to as the Series 626 or Mainframe. Before reading these instructions, you should be familiar with the Mainframe information described in Volume 1 of the Mainframe manual.

1.3 APPLICATIONS AND PURPOSE

The 6013 plug-in provides bi-directional interfacing for remote operation of the Series 626 via the RS-232C DATA PORT. It also provides storage in its own stack memory (with battery backup) for up to 960 disturbance events outputted from the Series 626 COMMUNICATIONS PORT. It then re-transmits the data to your terminal, printer, or, via an external modem, to another site. Transmission may be on-demand or at programmed time intervals.

After log-on, the plug-in transparently receives your commands via the RS-232C interface cable to its DATA PORT. It then passes your command from its COMM PORT, through the 626/6013 interface cable, into the Series 626's COMMUNICATIONS PORT to the Mainframe, where it is then processed. Output data are then sent back to the plug-in, and then to you, via the DATA PORT.

The 6013 plug-in may be programmed to transmit whenever an operator (on-site or remote) requests a transmission, immediately upon the occurrence of a disturbance event, on a periodic basis every X hours, or when memory is nearly full. Because the plug-in possesses a non-volatile memory, simply turning off the Series 626 will <u>not</u> erase its memory (unless its batteries become depleted or disconnected). A rear panel LED lights whenever there is data transmission activity.

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1.4 PHYSICAL CONFIGURATION

The 6013 plug-in is a single width module: 6½" high by 1¼" wide by 10" deep. It is designed for installation into any one of the five slots of the Series 626 Mainframe.

NOTE

It is preferable to use slot #1 to avoid entangling the signal input lines with the communications lines.

The 6013 plug-in's RS-232C COMM PORT is connected to the Series 626's RS-232C COMMUNICATIONS PORT via a 626/6013 interface cable (Dranetz P/N 110540).

The module consists of two PC boards:

1) The primary board is the CPU/module interface board. It contains the RS-232C interface circuits of the DATA and COMM PORTS (including the D-connectors), "Ring" circuit, Series 626 module interface circuitry, and the stack memory (up to 32K of CMOS RAM).

2) The secondary board contains the battery back-up circuitry.

1.5 TECHNICAL SPECIFICATIONS

The technical specifications for the 6013 plug-in are listed in Table 1-1 which begins on the following page. The major sections of Table 1-1 are as follows:

		Page
I.	MEMORY	1-3
II.	COMM PORT (RS-232C COMMUNICATIONS PORT)	1-3
III.	DATA PORT	1-3
IV.	PROGRAMMABLE FEATURES	1-5
V.	OPERATIONAL DISTURBANCE MESSAGES	1-6

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Table 1-1. Technical Specifications (page 1 of 5)

I. MEMORY

A. Size: 32 kilobytes, max

B. Type: CMOS RAM

C. Allocation:

1. CPU: 1 kilobyte (Includes a 16-byte IRQ stack, and two 112-byte buffers for remote RECEIVER MODE buffering)

2. DATA STACK: 30 kilobytes

3. RE-TRANSMIT STACK: 1 kilobyte

D. Typical Event Capacity: 960 @ 32 characters/event

II. COMM PORT (RS-232C COMMUNICATIONS PORT)

A. Type: RS-232C compatible (DTE configuration)

B. Connection: To the Series 626 COMMUNICATIONS PORT via the interface cable (P/N 110540)

C. Baud Rate: Derived from the transmit/receive clock (pin 17) of the Series 626's COMMUNICATIONS PORT

D. Data Processing:

1. Received from the Series 626's COMMUNICATIONS PORT on an interrupt basis

2. Transmitted to the Series 626's COMMUNICATIONS PORT on a non-interrupt basis

III. DATA PORT

A. Type: RS-232C compatible (DCE configuration)

B. Baud Rate: User-programmable to 300, 1200, 2400, 4800, or 9600 baud

NOTE

The DATA PORT's baud rate should be greater than or equal to the COMM PORT's baud rate.

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Table 1-1. Technical Specifications (page 2 of 5)

C. Connection Request: Initiated by pressing the rear panel DATA PORT RING push button, or via the DATA PORT Ring line (pin 22) being pulsed ON/OFF

D. Status Indicator: Red LED on the rear panel lights whenever the DATA PORT is active

E. Data Processing:

1. Received from the DATA PORT on a non-interrupt basis

2. Transmitted to the DATA PORT on an interrupt basis when the stack data are being transmitted, and on a non-interrupt basis when in the RECEIVER MODE

F. Data Transmission Protocol:

1. Comparable to ISO 1745, except:

a. When in RECEIVER MODE, operates transparently, full duplex--Series 626 protocol followed

b. When in a wait loop, if the timer times out, instead of re-transmitting the current block, the next block of data is transmitted

2. Control characters sent out of the Series 626 for data transmission are suppressed and only inserted according to ISO 1745

3. Typical transmission format:

SOH/"STATION#xx"/STX/data (1K)/ETB/--wait time--/
STX/data/ETB/...../STX/ last block of data /ETX/
"END OF XMIT"/--wait time--/"BYE"/DLE/EOT
(call terminated)

During wait time, looks for:

ACK: Positive Acknowledge
NAK: Negative Acknowledge
EOT: Terminate Call, End of Transmission

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Table 1-1. Technical Specifications (page 3 of 5)

IV. PROGRAMMABLE FEATURES

A. Stack Memory Dump Modes:

1. NEVER	--Holds all data regardless of the stack conditions
2. STK FLL	--Transmits data when only 200 free bytes of the stack remain
3. EVRY EVNT	--Transmits each time any data goes into the stack
4. ON RQST	--Transmits only when given the proper command by an on-site user while in the PROGRAM MODE, or by a remote user while in the IMMEDIATE TRANSMIT MODE
5. EVRY X HRS	--Transmits the stack data every X hours (where X is a value from 01 to 99)
6. EVRY X HRS W/ STK FLL OPT	--Transmits the stack data every X hours with the Stack Full option (same as 2 and 5)

B. Baud Rate for the DATA PORT

1. 300
2. 1200
3. 2400
4. 4800
5. 9600

C. Station ID:

1. Min # = 00
2. Max # = 99

D. Preset Values

1. TRANSMIT MODE = ON RQST
2. Baud Rate = 300
3. Station ID = 00

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Table 1-1. Technical Specifications (page 4 of 5)

V. OPERATIONAL DISTURBANCE MESSAGES

A. Possible Events:

1. DATA LINE DEAD	--Data line goes dead while the DATA PORT is active or an improper termination procedure is used
2. COMM PORT DEAD	--DSR or CTS signal from the Series 626 is "bad", or the transmitter or receiver will not clear
3. DATA PORT DEAD	--DATA PORT is turned off due to a self-test failure during the SYSTEM CHECK, or DSR fails, or the transmitter or receiver will not clear
4. OVFLW STK OVFLW	--Overflow Stack overflowed--stack memory full, data possibly lost ($ char will show up in the dump)
5. DATA PORT BUSY	--Transmitter busy--request for SYSTEM CHECK but the DATA PORT is active so the test cannot be made
6. RAM MEM DEAD	--CPU RAM massive failure--insufficient RAM to permit continued proper operation--the 6013's CPU is shut down
7. NO DATA SENT	--Cannot complete connection after 128 attempts, transmission request is cleared
8. RCV BUFFR OVFLW	--Receiver buffer overflow--receiver buffer for remotely received characters is full
9. DSR 626: OFF	--RS-232C COMM PORT inoperable due to loss of the DSR signal from the Series 626's COMMUNICATIONS PORT
10. DSR 626: ON	--RS-232C port is restored upon restoration of DSR signal from the Series 626's COMMUNICATIONS PORT

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Table 1-1. Technical Specifications (page 5 of 5)

11. IRQ STK OVFLW	--IRQ stack overflowed--possible loss of "disturbance" data from the 6013's CPU to the module interface
12. DATA PORT IN	--Received DATA PORT connection (access) request via the rear panel DATA PORT RING push button or Ring line of the DATA PORT connector
13. DATA PORT OUT	--Made a successful connection out
14. DATA PORT DONE	--DATA PORT connection terminated--proper termination procedure followed

B. Format:

C. Short Term Accumulator:

1. The SUMMARY MODE event printout is the same as above, with the exception that no time data is shown

VI. REMOTE COMMAND SUMMARY

Command	Description	Abbreviation	ASCII
Ctrl-D	Terminates connection	(EOT)	$04
Ctrl-U	Retransmits block	(NAK)	$15
Ctrl-F	Transmits next block	(ACK)	$06
!	Dump stack command		$7C

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1.6 FUNCTIONAL DESCRIPTION

The following subsections provide a functional description of the 6013 plug-in and its connecting peripherals.

1.6.1 RS-232C COMM PORT Connections

The 6013 plug-in's RS-232C compatible communications port, referred to as the COMM PORT, is connected to the Series 626's RS-232C COMMUNICATIONS PORT via the 626/6013 interface cable.

1.6.1.1 RS-232C COMM PORT Configurations

The 6013 plug-in's COMM PORT is configured as a DTE (Data Terminal Equipment); the Series 626's COMMUNICATIONS PORT is a DCE (Data Communications Equipment). The plug-in monitors the DSR (Data-Set-Ready) and CTS (Clear-to-Send) lines from the Series 626. Any change of state of the DSR signal produces a disturbance printout. The CTS line is allowed to be "busy" (high) for up to 80 milliseconds. If it is "busy" for more than 80 milliseconds, it is signaled as an "RS-232C PORT DEAD" error.

The COMM PORT's baud rate is determined by the Xmit/Rcv Clk signal (pin 17) from the Series 626's COMMUNICATIONS PORT. Data sent to the 6013 plug-in are processed on an interrupt basis. The data are then stored in the RAM stack until it they are retransmitted or the memory is filled up. If any data are missed (e.g., the result of an overflow, or in the unlikely occurrence that the plug-in is unable to service the interrupt in time), a special character, "$", is stored in memory in place of the overrun character to indicate that data are missing.

1.6.2 DATA PORT Connections

The 6013 plug-in's DATA PORT is configured as a DCE to allow connection to such DTEs as a terminal, printer, etc. To use the plug-in with a DCE device, such as a modem, a reversing cable must be used. The DATA PORT's baud rate is user-programmable to 300, 1200, 2400, 4800, or 9600.

NOTE

The DATA PORT's baud rate should be greater than or equal to the COMM PORT's baud rate (which is determined by the Series 626's COMMUNICATIONS PORT baud rate). This allows the data to be outputted through the DATA PORT at least as fast as it enters from the COMM PORT.

1.6.2.1 DATA PORT Connecting Pin Diagrams

Illustrated on the following page are the various pin connections for connecting the DATA PORT to DCE and DTE configured devices.

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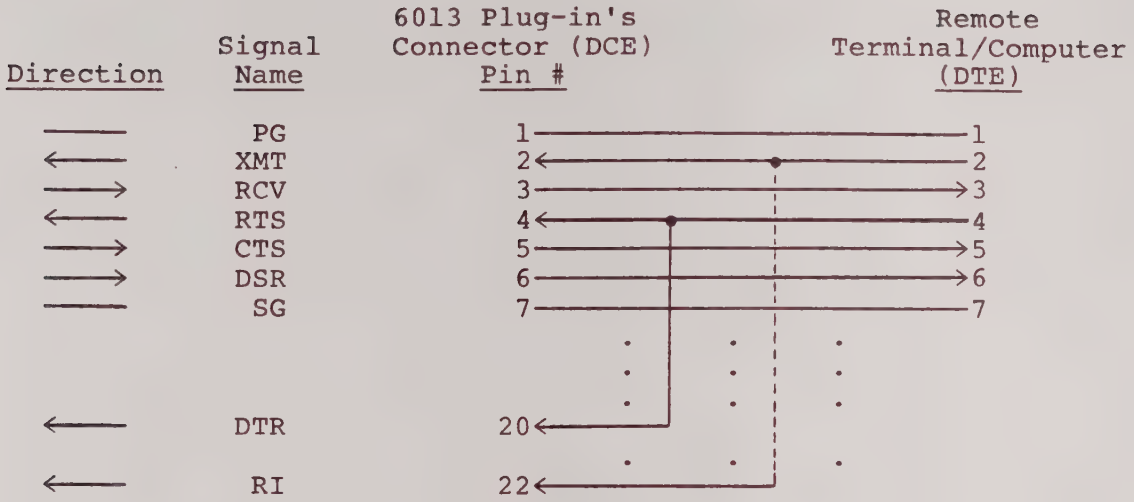
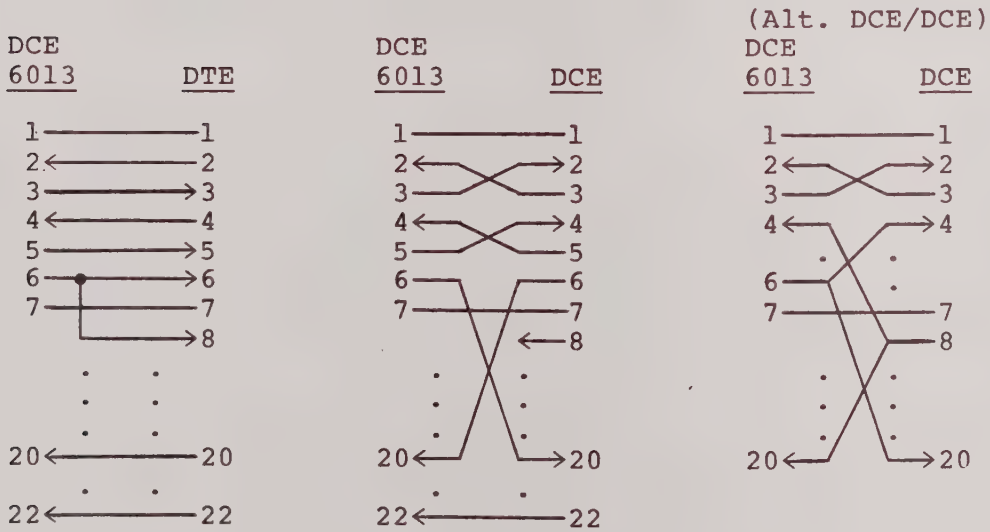
DATA PORT Signal Directions
(Configuration: DCE)



If no separate Ring line is used, the XMT line (pin 2) may be connected to the RI line (pin 22) to provide a "psuedo-ring" signal (see dashed vertical line in the above diagram).

Other Possible Configurations



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1.6.2.2 DATA PORT Communications

Once the proper conditions of the user-selected TRANSMIT MODE have been met, the 6013 plug-in attempts communication with the device connected to its DATA PORT. If no connection has been established, the DATA PORT is turned off and the error message "NO DATA SENT" is transmitted.

If the DATA PORT device is "busy", the plug-in will try for up to 128 attempts to make a connection. If no connection is made within these attempts, the error message "NO DATA SENT" is transmitted and the DATA PORT is turned off until the Series 626 is reset or a SYSTEM CHECK is successfully completed.

1.6.3 Data Transmission Sequence

Once the connection has been made and the handshaking (connection verification) is completed, the 6013 plug-in transmits the message "STATION#XX" (where XX is the user-programmed ID number). This identifies the unit in cases where there are multiple units calling the same location. The data are then asynchronously transmitted, in 1K blocks, using 11-bit ASCII format (1 start bit, 7 data bits, 1 even parity bit, and 2 stop bits), in comparable ISO (International Standards Organization) 1745 protocol, by an interrupt driven routine to allow for maximum throughput.

When a block of data is completed or the end of the data is reached, the plug-in waits for up to 10 seconds while looking for a positive acknowledge character (ACK), a negative acknowledge character (NAK), or the end of transmission character (EOT).

If a NAK character is received, the last block of data is re-transmitted; the plug-in then returns to the 10-second wait loop. If an ACK character is received, the plug-in leaves the wait loop and the next block of data is transmitted; the plug-in then returns to the 10-second wait loop. If an EOT character is received, the access is immediately terminated. If no character is received and the wait loop times out, the next block of data is transmitted. This process continues until all of the data have been transmitted.

After all of the data have been transmitted, an "END OF XMIT" message is sent. After the final wait time has expired, the plug-in sends a "BYE" message. The data line is then disconnected and the "busy" status is cleared.

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1.6.4 Communication Requests

If the 6013 plug-in receives a connection request (via its rear panel push button or Ring line of the DATA PORT connector), it first activates the DATA PORT by turning the PORT's DSR line on. It then waits two seconds for the line to stabilize. Next, the plug-in turns its RTS on, which appears as a DCD and CTS signal to the DATA PORT device. The plug-in checks for a DTR signal from the DATA PORT and then waits for up to 2.5 seconds for a Request to Send (RTS) signal. Once all signals are established, the plug-in sends a "?" and waits up to 16 seconds while looking for the sequence "IDXX" (where XX is the station identifier). If the correct ID sequence is not received, the plug-in disconnects the data line. (This is done in order to deter unauthorized access to the unit by making it more difficult for someone [or something] to try to "guess" the access code.

NOTE

If the "psuedo-ring"* signal configuration (XMT-RI) is used (refer to the top diagram of subsection 1.6.2.1), the first character received by the 6013 plug-in activates the Ring/Answer procedure. After the character is received by the plug-in, it responds (after a brief 2.5 second time-out) with the "?" character. All operation is then the same as before--you must enter "IDXX", etc.

1.6.4.1 Communication

If the proper characters are received, the 6013 plug-in waits one second and then sends the message "XX-READY". This informs you that the system is ready to receive data. The plug-in is placed in the RECEIVER MODE (transparent to the remote user). All data received from the remote end are sent to the Series 626's COMMUNICATIONS PORT via a 112-character buffer.

---

* -The "psuedo-ring" configuration allows the Ring signal to be generated by the first character received from the transmission line. After the character is received, the 6013 plug-in behaves exactly as described above--after the connection request is detected, the plug-in activates the port by turning on the DSR, etc.

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NOTE

If the baud rate of the Series 626's COMMUNICATIONS PORT is greater than the buad rate of the the 6013 plug-in's DATA PORT, characters may appear to be lost; however, the characters are stored in the stack memory and will be available to the DATA PORT terminal during a stack dump of the plug-in.

If RTS should drop for more than 2.5 seconds, the plug-in will send the message "BYE" and terminate the connection. When a connection is successfully completed, whether outgoing or incoming, a corresponding "DATA PORT OUT/DATA PORT IN" event message is printed by the Series 626. Similarly, when a call is terminated, a "DATA PORT DONE" message is printed. (This gives you a printed recording of all communication accesses.)

1.6.5 Stack Dump

Only the special stack dump character, "¦" (ASCII $7C), is intercepted by the 6013 plug-in. If this character is received, a check is made to see if the unit is in the IMMEDIATE TRANSMIT (ON RQST) MODE. If not, a "NOGO" message is sent, followed by "BYE", and access is terminated. (The purpose of this is to again deter access to the data, for once the data are transmitted, they are cleared from memory.) If the IMMEDIATE TRANSMIT MODE is in effect, the RECEIVER MODE is suspended until all of the data have been transmitted as described above. After completion of the stack dump, the plug-in returns to the transparent RECEIVER MODE.

1.6.6 6013 Plug-In's CPU Communication

The 6013 plug-in's CPU communicates to the module interface software via a mailbox technique. Either software program may request and gain control of the common RAM, provided the other side doesn't already have control. Simultaneous requests are prevented by clock phasing. Once the request is granted, the RAM may be written to or read from. Data are passed between the plug-in's CPU and the module interface in this manner. To signal the other side that new data are there or that certain data are requested, an IRQ line for each side may be set, and then cleared once the other side has acknowledged it.

Because the plug-in's CPU could generate interrupts faster than the module interface can process, its CPU has a 16-byte IRQ stack to send interrupts whenever possible. Any error conditions, data status requests, and program parameter changes are exchanged in this manner.

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1.6.7 6013 Plug-In's SYSTEM CHECK Routine

The 6013 plug-in's SYSTEM CHECK routine checks the memory, COMM PORT status, and the DATA PORT.

1. To determine the size of operational (valid) memory, memory is swapped out, page by page, and a series of test characters are written in, read back, and then compared.

2. The status lines of the COMM PORT are then checked.

3. The DATA PORT is checked by selecting a TEST line, which loops the output of the transmitter back to the receiver just behind the PORT connector. A series of test characters are then sent out, read back, and compared to determine the status of the PORT. This tests nearly all of the PORT's circuitry with the exception of the switches that isolate the PORT under the test. In the event that the PORT was turned off for any reason, a successful completion of the SYSTEM CHECK routine re-enables it.

1.6.8 6013 Plug-In's Module Interface Software

The 6013 plug-in's module software interfaces to the Series 626's CPU. It controls the printing of Operational Disturbance, Program, and SYSTEM CHECK printouts, as well as the program routine for the user-programmable parameters. It runs independently of the plug-in's CPU program, except when a conflict for control of the common RAM exists, or when it is waiting for a data response from the plug-in's CPU software.

1.7 STANDARD ACCESSORIES

Part #	Quantity	Description
TM-111916 Volume 1	1	Operator's manual
P/N 110540	1	626/6013 interface cable

1.8 OPTIONAL ACCESSORIES

Part #	Quantity	Description
TM-111916 Volume 2	1	Service (Maintenance) manual

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1.9 FACTORY REPAIR

When factory repair is required, proceed as follows:

1. Contact Dranetz Customer Service Department to obtain an authorization number for factory repair:

   Telephone No: (201) 287-3680

   TWX: (710) 997-9553

   FAX: (201) 248-9240

   Telex: 499-7808

   Cable: DRANETZ

2. Fill out the REPAIR/SERVICE ORDER form enclosed in the Series 626 Operating manual. Ship it along with the malfunctioning equipment to the Dranetz Customer Service Department.

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SECTION II
INSTALLATION AND OPERATION

2.1 GENERAL

This section contains the installation, programming, and operating instructions for the 6013 plug-in.

2.2 LOAD RATINGS

The Series 626 standard Mainframe has an upper limit of the combined total rating of its installed modules. The overall Mainframe capacity is set at 20 units. The individual modules (existing as of this printing) have the following load ratings:

Table 2-1. Load Ratings

Plug-in	Load Rating	Plug-in	Load Rating
626-PA-6001	2 Units	626-PA-60012A	3 Units
626-PA-6001 with Extra Option Board	3 Units	626-PA-6013	2 Units
626-PA-6002	2 Units	626-PA-6014	1 Unit
626-PA-6003	4 Units	626-PA-6015	4 Units
626-PA-6005	2 Units	626-PA-6018	4 Units
626-PA-6006	2 Units	626-PA-6020	4 Units
626-PA-6007	1 Unit	626-PA-6024A	4 Units
626-PA-6008	2 Units	626-PA-6024B	4 Units
626-PA-6009	4 Units	626-PA-6025	4 Units
626-PA-6011	1 Unit	626-PA-6030	6 Units
626-PA-6012	2 Units	626-PA-6037	1 Unit
		626-PA-6038	1 Unit
		626-PA-6040	6 Units

NOTE

When selecting modules for installation into any Series 626 Mainframe, verify that the sum of the load ratings of the installed modules DOES NOT exceed 20 Units.

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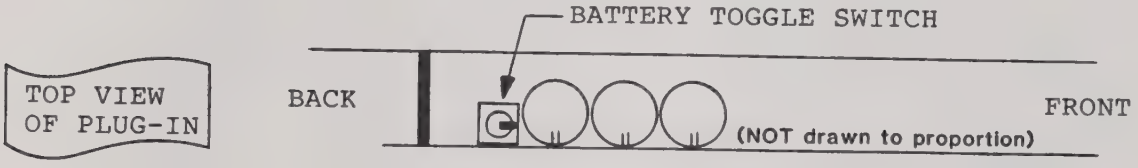
2.3 INSTALLATION

To install the 6013 plug-in into the Mainframe, proceed as follows:

WARNING

Be sure that the Series 626 Mainframe and all of the power connected to its plug-in modules are first turned OFF before proceeding with any installation.

1. Remove the 6013 plug-in from its packaging. Flip the battery ON/OFF toggle switch, located on the top of the left-hand board (near the batteries), to the ON position (toward the batteries).



CAUTION

Power is now supplied to the on-board CMOS RAM. Be careful not to "short" any traces, otherwise damage may result. Also, shorting any of the terminal pins on the bottom of the board may cause a loss of data.

NOTE

When storing the 6013 plug-in outside the Series 626 Mainframe, set the battery toggle switch to the "OFF" position to prevent possible damage to the plug-in.

2. Position the top and bottom front corners of the plug-in module into the upper and lower tracks of the desired slot position at the rear of the Series 626 Mainframe.

3. Carefully slide the module into the Mainframe until it is firmly in position.

4. Tighten the top and bottom captive screws in order to secure the module to the Mainframe.

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2.3.1 Connecting the 6013 Plug-In

The 6013 plug-in has two connectors on its rear panel. One is for connection to the Series 626 Mainframe, and the other is for connection to a terminal, printer, CRT, modem, etc. To connect the plug-in, proceed as follows:

1. Connect one end of the 626/6013 interface cable (P/N 110540) to the 6013 plug-in's COMM PORT, and the other end to the Series 626's RS-232C COMMUNICATIONS PORT.

2. Connect the 6013 plug-in's DATA PORT to your terminal, printer, CRT, modem, etc., with an appropriate interface cable. (Refer to the diagrams in subsection 1.6.2.1 for the pin-outs and the proper wiring for connecting to DCE and DTE configurations.)

2.4 OPERATING THE 6013 PLUG-IN

This following subsection contains information on the Series 626's operating controls and indicators used by the 6013 plug-in.

2.4.1 Operating Controls and Indicators

The 6013 plug-in uses a menu-style format for selecting items. The functions of the Series 626's operating controls and indicators used by the 6013 plug-in are described in Table 2-2 on the following page. Figure 2-1 on the page after illustrates these controls on a typical front panel of a Series 626. For a description of the controls common to overall Series 626 operation, refer to Volume 1 of TM-106650U (Series 626 Universal Disturbance Analyzer Operator's Manual).

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Table 2-2. 6013 Plug-In Operating Controls

ITEM	FUNCTION
Numeric Keyboard*	Allows the selection of menu items
Numeric Keys	Used to enter numerical values for the various functions.
[DATA] push button	Produces a Data Summary printout when pressed.
[PROG] push button	Produces a Program Summary printout when pressed.
[PRESET] push button	With the FUNCTION key switch set at "PROGRAM", and a channel push button [1], [2], [3], [4], or [5] depressed, pressing [PRESET] recalls the "Factory Preset" program for that channel.
[ENTER] key	Transfers the numeric keyboard value into the 6013 plug-in's main memory when pressed.
[FNC] key	When pressed and then followed by a [1], [2], [3], [4], or [5] key, the [FNC] key allows you to 1) clear the plug-in's memory, 2) program the TRANSMIT MODE, 3) program the station ID, 4) perform an immediate data transmission, or 5) program the DATA PORT's baud rate (respectively).
OTHER FRONT PANEL CONTROLS AND INDICATORS	Refer to Volume 1 of the Mainframe Manual (Operator's Manual).

* -"Key" and "keyboard" represent the red, green, and yellow keys. "Push button" represents the black selector buttons.

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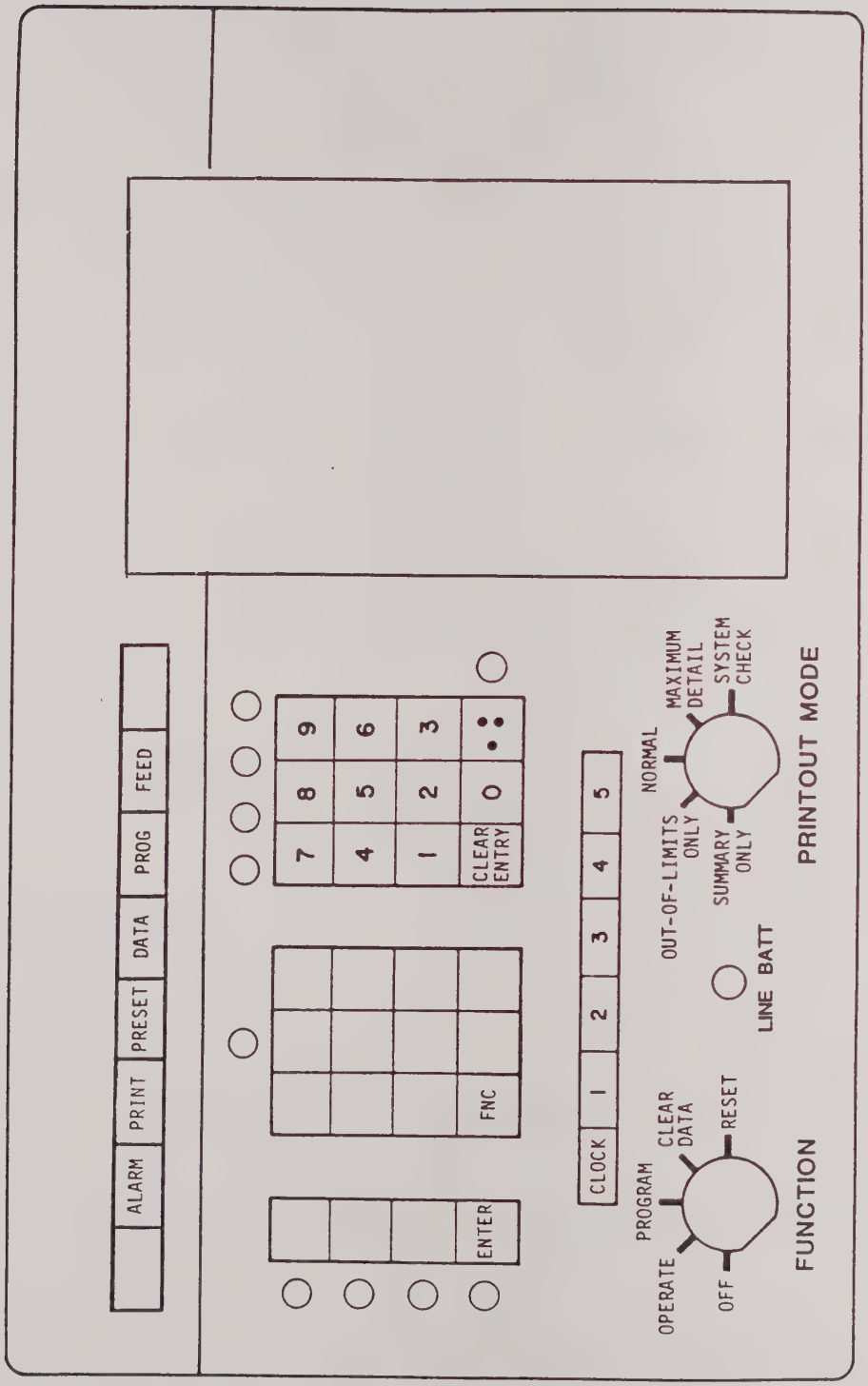

Figure 2-1. Series 626 Controls used by the 6013 Plug-in

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2.5 6013 PLUG-IN PROGRAMMING OPERATIONS AND FUNCTIONS

The 6013 plug-in allows five programming operations and functions while in the PROGRAM MODE. They are:

1. Clearing the 6013 plug-in's stack memory (CLR MEM).
2. Programming the TRANSMIT MODE (XMIT MODE).
3. Programming the 2-Digit Station ID Number (ID #).
4 Performing an Immediate Transmission of the data in the stack memory (XMIT).
5. Programming the DATA PORT's Baud Rate (BAUD RATE).

2.5.1 Programming Procedure for the 6013 Plug-In

(1) Turn on the Series 626. Turn the FUNCTION key from the "OPERATE" position to the "PROGRAM" position.

a. A Program Summary for the currently selected channel will be immediately printed.*

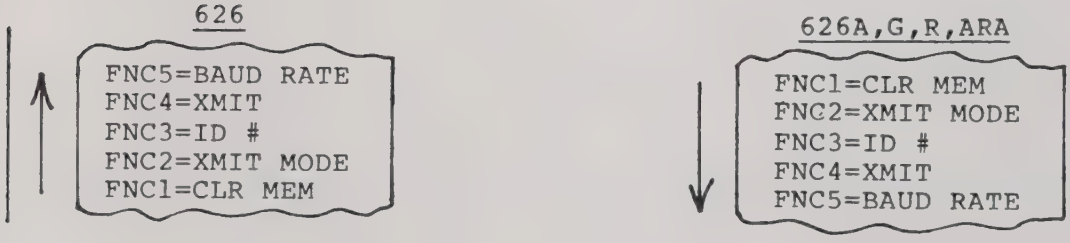
(2) Press the channel push button (one through five) corresponding to the slot position of the 6013 plug-in.

a. The channel's Program Summary is immediately printed.

NOTE

The "Factory Preset" program may be recalled at any time during the PROGRAM MODE. (Refer to subsection 2.5.2 for more information on the PRESET function.)

b. The red LED above the center bank of keys lights, and the following is printed:



* -If the selected channel is empty, the message "CHANNEL EMPTY" is printed.

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NOTE

The parameters programmed under subsections 2.5.1.1 thru 2.5.1.4 do not have to be programmed in their given order. Use whatever order is appropriate for your specific situation when programming them.

2.5.1.1 **Programming the Baud Rate**

a. The red LED above the center bank of keys should be lit.

(1) Press the red [FNC] key.*

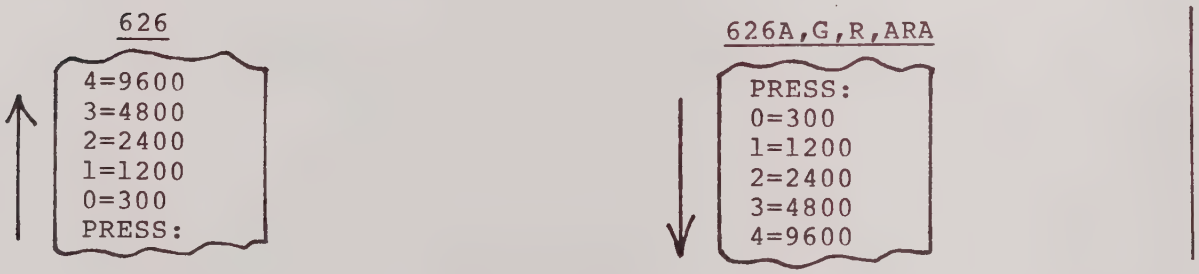
(2) Press [5] to begin programming the baud rate.

a. Because FNC5=BAUD RATE. (See printout in subsection 2.5.1, step (2)b.)

b. The green LED next to the [ENTER] key lights, waiting for [ENTER] to be pressed.**

(3) Press [ENTER].

a. The green LED goes out and the following prompt message is printed:



b. One yellow LED lights, indicating that the digit corresponding to the desired baud rate must now be entered.

(4) Press the [0], [1], [2], [3], or [4] key.

a. For Example: For a baud rate of 300, press [0].

* -Numbers and letters shown in brackets "[]" in this manual stand for the individual red, green, and yellow keys.

** -Pressing [CLEAR ENTRY] before [ENTER] will clear the current sequence of numeric keys which have been pressed.

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NOTE

If the PORT status is "bad" ("DATA PORT BAD") or "busy" ("DATA PORT BUSY"), the previous printout will not occur when [ENTER] is pressed; the program sequence returns to the level of subsection 2.5.1, step (2)b. The baud rate cannot be changed when the PORT status is "bad" or "busy".

2.5.1.2 **Programming the TRANSMIT MODE (XMIT MODE)**

a. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

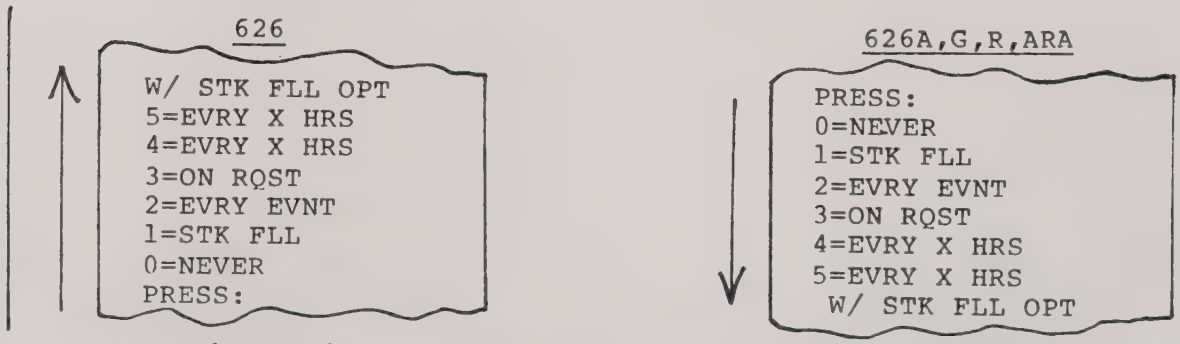
(2) Press [4].

a. Because FNC4=XMIT.

b. The green LED lights.

(3) Press [ENTER].

a. The following list of TRANSMIT MODE options is printed:



b. A single yellow LED lights, indicating that a digit, [0] through [5], must be pressed to enter the desired TRANSMIT MODE.

(4) Press the key, [0] through [5], corresponding to your desired TRANSMIT MODE.

a. If a [0] through [3] key is pressed, the programming sequence returns to the level of subsection 2.5.1, step (2)b, without need for further entries, i.e., disregard step (5).

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(5) Enter the "hours" digits and press [ENTER]--if a [4] or [5] key was previously pressed.

a. For Example: If your desired TRANSMIT MODE is every eight hours, first press [4] (because 4=EVRY X HRS).

b. The green LED lights.

c. Press [ENTER].

d. The following is printed:

e. Two yellow LEDs light, indicating that the hours between transmissions must now be entered. The entered value may range from 01 to 99 hours (leading zeroes must be entered).

f. Enter the "hours" digits: [0] [8].

g. The green LED lights.

h. Press [ENTER].

i. The new programming is now stored in CMOS RAM. A new Program Summary showing the new program values is printed; the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.3 Programming the Station ID Number (ID #)

a. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

(2) Press [3].

a. Because FNC3=ID #.

b. The green LED lights.

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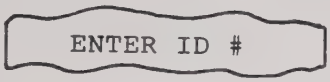
(3) Press [ENTER].

a. The following prompt is printed:



b. Two yellow LEDs light, indicating that the ID number, a value ranging from 00 to 99, must now be entered. (Leading zeroes must be included.)

(4) Press the keys corresponding to the ID number.

a. For Example: To enter an ID number of 42, press the [4] and then [2] key.

(5) Press [ENTER].

a. The new ID number is stored in memory, an updated Program Summary is printed, and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.4 Performing an Immediate Data Transmission (XMIT)

a. The TRANSMIT MODE must be programmed to ON RQST. Do this by repeating subsection 2.5.1.2 and selecting a [3] for the ON RQST option of the TRANSMIT MODE.

NOTE

If an Immediate Transmit is attempted while the TRANSMIT MODE is not set to ON RQST, the programming sequence will return immediately to the level of subsection 2.5.1, step (2)b.

b. The red LED above the center bank of keys should be lit.

(1) Press [FNC].

a. A single yellow LED lights.

(2) Press [4].

a. The green LED lights.

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(3) Press [ENTER].

a. The following prompt message is printed:

626

```
IMMEDIATE XMIT
PRESS: 1=YES 0=NO
```

626A,G,R,ARA

```
PRESS: 1=YES 0=NO
IMMEDIATE XMIT
```

(4) Press [0] and then [ENTER] to abort; press [1] and then [ENTER] to confirm YES.

a. The printout in step (3)a is a confirmation step to safeguard against accidental transmissions which would result in the loss of data. If a [0] is pressed, followed by [ENTER], the immediate transmission sequence is aborted and the programming sequence returns to the level of subsection 2.5.1, step (2)b. If a [1] is pressed, followed by [ENTER], the immediate transmission sequence is initiated and the following message is printed:

```
! IMMEDIATE XMIT
```

A Program Summary is printed and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.5 Clearing the 6013 Plug-In's Memory

a. The red LED above the center bank of keys should be lit.

(1) Press [1].

a. Because FNC1=CLR MEM.

b. The verification prompt message is printed as follows:

626

```
CLR MEM
PRESS: 1=YES 0=NO
```

626A,G,R,ARA

```
PRESS: 1=YES 0=NO
CLR MEM
```

c. A single yellow LED will light.

(2) Press [0] and then [ENTER] to abort; press [1] and then [ENTER] to confirm YES.

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a. If [0] is pressed, followed by [ENTER], the CLEAR MEMORY sequence is aborted and the programming sequence returns to the level of subsection 2.5.1, step (2)b.

b. If [1] is pressed, followed by [ENTER], the following is printed:

```
! CLR MEM
```

c. This acknowledges the erasure of all previously stored data.

d. The programming sequence returns to the level of subsection 2.5.1, step (2)b.

2.5.1.6 Completion of the Programming

When the 6013 plug-in's programming is completed, you may proceed to program another module, by pressing another channel push button, or place the Series 626 on-line by turning the FUNCTION key to the "OPERATE" position.

While on-line, you may obtain the program currently in effect by simply pressing the black [PROG] push button.

2.5.2 Selecting the "Factory Preset" Program

To select the "Factory Preset" program, proceed as follows:

(1) Turn the FUNCTION key to the "PROGRAM" position.

a. A Program Summary for the currently selected channel is immediately printed.*

(2) Press the channel push button (one through five) corresponding to the slot position of the 6013 plug-in.

a. The channel's Program Summary is immediately printed.

b. The red LED above the center bank of keys lights and the following is printed:

626

```
FNC5=BAUD RATE
FNC4=XMIT
FNC3=ID #
FNC2=XMIT MODE
FNC1=CLR MEM
```

626A,G,R,ARA

```
FNC1=CLR MEM
FNC2=XMIT MODE
FNC3=ID #
FNC4=XMIT
FNC5=BAUD RATE
```

* -If the selected channel is empty, "CHANNEL EMPTY" is printed.

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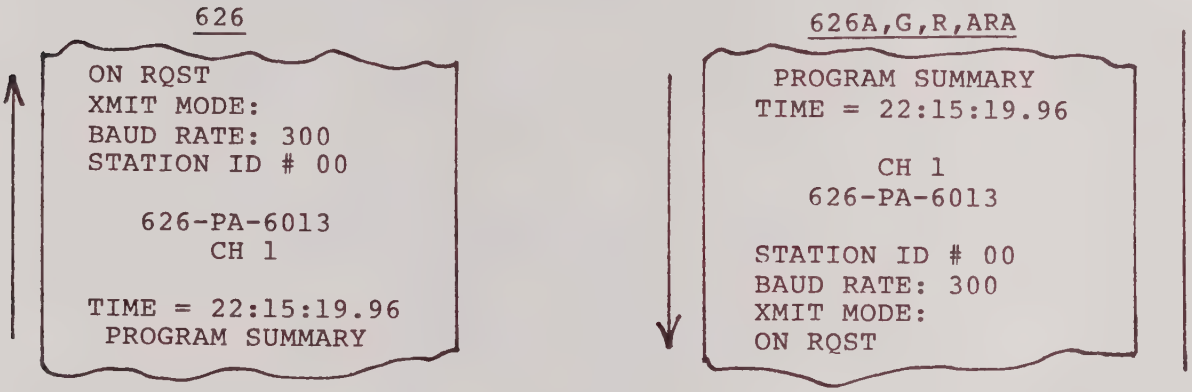
(3) Ignore this printout and press the black [PRESET] push button.

a. This recalls the "Factory Preset" program from memory.

b. A Program Summary indicating the PRESET values is printed, and the programming sequence returns to the level of Subsection 2.5.1, step (2)b.

c. An example of the "Factory Preset" printout is as follows:



NOTE

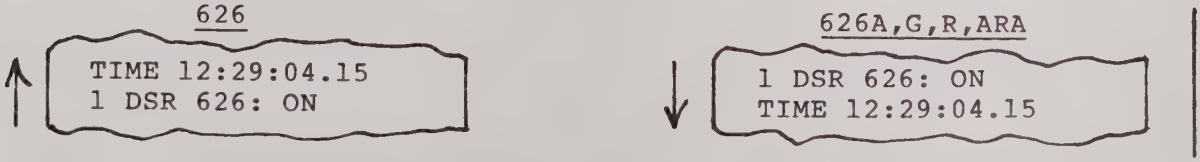
The "Factory Preset" program cannot be recalled while the DATA PORT's status is "bad" or "busy".

2.6 OPERATIONAL PRINTOUTS

This subsection contains information on obtaining an Operational Disturbance Printout, Data Summary Printout, and Short-Term Accumulator's Printout.

2.6.1 Operational Disturbance Printout

Any operational disturbances encountered by the 6013 plug-in are printed by the Series 626. These printouts are not affected by any of the various printout modes of the Series 626. The possible Operational Disturbance printouts are listed in Table 1-1, Roman Numeral V. A typical example is as follows:



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2.6.2 Data Summary Printout

A Data Summary printout is requested by pressing the black [DATA] push button while the FUNCTION key is in the "OPERATE" position. It will also be automatically printed each day at midnight (refer to TM-106650U for an explanation).

The Data Summary printout serves as a status check for the 6013 plug-in. The following is an example of a typical Data Summary printout:

626

```
COMM PORT = GOOD
DATA PORT = GOOD
MEM- 0960 = GOOD
# CALLS = 10
   626-PA-6013
       CH 1

TIME = 22:15:12.29
     DAY # 01
  DATA SUMMARY
```

626A,G,R,ARA

```
  DATA SUMMARY
    DAY # 01
TIME = 22:15:12.29

      CH 1
  626-PA-6013
# CALLS = 10
MEM- 0960 = GOOD
DATA PORT = GOOD
COMM PORT = GOOD
```

2.6.3 Short-Term Accumulator's Printout

If disturbances occur at a faster rate than the Series 626 is capable of processing and printing, and if the Series 626's internal event stack memory overflows, then any subsequent events are stored in the Short-Term Accumulator (in summary form) until the overflow condition is cleared.

NOTE

The overflow problem may be avoided to some extent by setting the Series 626's baud rate to 9600 and turning off its printer. The 6013 plug-in will then collect up to 960 disturbance events.

The event values are automatically cleared after the printout of the Short-Term Accumulator is completed. The event format is identical to the Operational Disturbance printout, with the exception that no time data are printed. An example of a typical Short-Term Accumulator's printout is as follows:

626

```
1 DATA PORT IN
1 DSR 626: OFF
1 COMM PORT DEAD

   626-PA-6013
```

626A,G,R,ARA

```
   626-PA-6013

1 COMM PORT DEAD
1 DSR 626: OFF
1 DATA PORT IN
```

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2.7 REMOTE LOG-ON PROCEDURE

To log-on the 6013 plug-in from a remote location:

(1) Connect the 6013 plug-in's DATA PORT to your terminal, printer, etc., using an appropriately configured RS-232C interface cable. (Refer to subsection 1.6.2.1 for the DATA PORT connecting pin diagram configurations.)

(2) Verify that the baud rate of the 6013 plug-in's DATA PORT and your terminal, printer, etc. are equal. If the baud rates are not equal, set them equal. (Refer to subsection 2.5.1.1 for programming the baud rate of the 6013 plug-in.)

(3) "Ring" the 6013 plug-in's DATA PORT by either:

a. Pushing the DATA PORT RING push button, or

b. If pin 2 is jumped to pin 22 (XMT-RING), send a character to the 6013 plug-in by typing any key on the remote terminal, printer, etc.

c. Pulse the Ring line (hi-lo-hi).

(4) The red LED on the rear of the 6013 plug-in lights.

(5) A question mark prompt appears on the terminal, printer, etc.

(6) Using the terminal or printer keyboard, type the letters "ID" followed immediately by XX (where XX is the unit's programmed ID number, e.g., 42, 37, 00, etc.).

(7) The 6013 plug-in responds with a "XX-READY" message, etc. It may now be remotely operated.

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2.7.1 Memory Full Condition

When attempting to access the 6013 plug-in remotely:

If after successfully completing the log-on procedure (unit responds with the "STATION # XX READY" message) the memory is full, then attempting any operation other than a data dump of the plug-in results in a "MEMORY FULL (¦)" message echoed to the remote terminal, printer, etc.

After the data are dumped and the COMM PORT is restored, all operations are again permitted.

NOTE

Because the 6013 plug-in's batteries maintain its memory even when the Series 626 is off (provided the battery switch is on), simply turning the unit off will not clear a Memory Full condition. When the memory is full at power-on, the plug-in's COMM PORT is immediately disabled. You must either clear the data manually while in the PROGRAM MODE, or the memory must be dumped to the remote terminal, printer, etc., before the COMM PORT is restored.

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SECTION III
OPERATIONAL TEST

3.1 GENERAL

This section describes the procedure used for verifying the 6013 plug-in's operation.

3.2 MINIMUM PERFORMANCE CHECK

A SYSTEM CHECK of the 6013 plug-in tests nearly all of its circuitry (memory, RS-232C COMM port, and DATA PORT status) to verify it is operating properly. Only the "Ring" circuit is not tested.

To perform the SYSTEM CHECK routine:

(1) Turn the PRINTOUT MODE key momentarily to the "SYSTEM CHECK" position, and then back to "NORMAL".

NOTE

On some older models of the Series 626's front panel, "SYSTEM CHECK" may instead read "CALIBRATE."

a. The following is performed:

First
To determine the size of the operational (RAM) memory, memory is swapped out, page by page, and a series of test characters are written in, read back, and then compared.

Second
The output of the DATA PORT is connected to the input and another series of characters are sent out, and then read back in. This is done to check for proper operation of the DATA PORT.

Third
The COMM PORT is checked for proper status signal levels.

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3.3 SUCCESSFUL COMPLETION OF THE SYSTEM CHECK

Successful completion of the SYSTEM CHECK results in a printout such as the following:

626

```
**********

RS232C PORT = GOOD
DATA PORT = GOOD
MEM- 0960 = GOOD

   626-PA-6013
       CH 1

TIME = 12:34:56.78
***SYSTEM CHECK***
```

626A,G,R,ARA

```
***SYSTEM CHECK***
TIME = 12:34:56.78

      CH 1
   626-PA-6013

MEM- 0960 = GOOD
DATA PORT = GOOD
RS232C PORT = GOOD


**********
```

3.4 UNSUCCESSFUL COMPLETION OF THE SYSTEM CHECK

If the printout from the SYSTEM CHECK routine does not read "GOOD" for all three readings, e.g., "RS232C PORT = GOOD," "DATA PORT = GOOD," and "MEM- 0960 = GOOD," contact the Dranetz Customer Service Department for further instructions (see sub-section 1.9).

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APPENDIX A

USING THE 6013 PLUG-IN WITH HAYES COMPATIBLE MODEMS

A.1 INTRODUCTION

When a Hayes compatible modem is connected to the 6013 plug-in's DATA PORT, certain procedures are recommended to ensrue proper operation. These procedures are incorporated in the subsections below.

A.1.1 Set-Up

1) Set the modem's configuration switches so that the result codes are NOT sent by the modem.

2) Verify that the modem and 6013 plug-in's baud rates are set correctly.

3) Connect the modem to the 6013 plug-in's DATA PORT using a "null modem" cable (refer to the Standard Cable Configuration in Subsection A.1.4).

A.1.2 Calling the Modem

1) Call the modem that the 6013 plug-in is connected to.

2) Press [ENTER] and wait for the "?".

3) Type "IDxx", where xx is the Station ID number.

4) Wait for the "xx-READY" message. After the message appears, the link is established.

A.1.3 Hanging Up

1) Send a Control-D to the 6013 plug-in (press [Ctrl] and [D] at the same time) to tell it that you're done.

2) Hang up the originating phone/modem.

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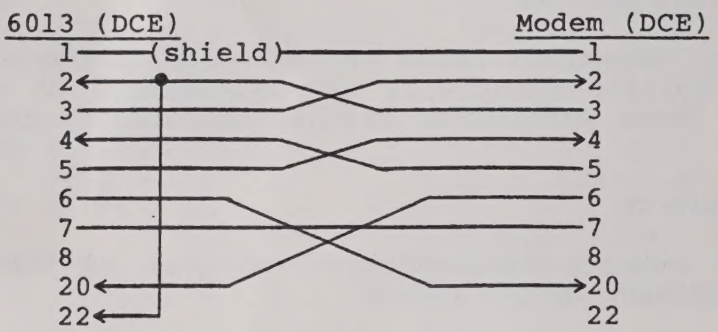
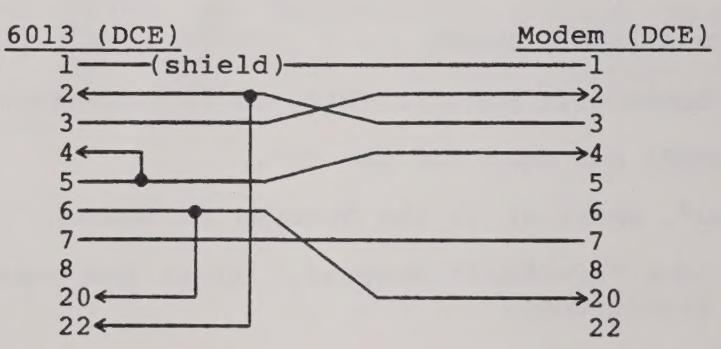
A.1.4 Cable Configurations

Standard Cable Configuration (See System Check Below)



Alternate Cable Configuration (See System Check Below)



A.1.5 System Check

When using an external modem with the 6013 plug-in, it's important to know how the modem uses the RS-232 handshake lines. Some modems activate the control lines only when the phone link is active (and you can use the Standard Cable Configuration), while others do not control the lines at all.

If your modem activates these lines only when a phone link is established, performing a System Check may falsely indicate that the DATA PORT is bad when there is no link established. Once the port is "bad", it can only be restored by turning the unit off and then back on, or by setting the control lines correctly and then performing another System Check. To avoid this problem, construct a cable that provides the proper levels on the handshake lines to the 6013 plug-in's Data Port as illustrated in the Alternate Configuration above.

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MP MASTER
MA23162